

REMARKS

Favorable reconsideration is respectfully requested in view of the foregoing amendments and remarks.

I. CLAIM STATUS AND AMENDMENTS

Claims 1-10 were pending in this application when last examined and stand rejected.

Claims 1-10 have been canceled without prejudice or disclaimer thereto. Applicants reserve the right to file a continuation or divisional application on any canceled subject matter.

New claims 11-15 have been added to replace original claims 1-10. Kindly note that the subject matter of the new claims corresponds to those in the equivalent EP patent application which has now been accepted.

New claim 11 incorporates the substance of previous claims 1 and 10. Additionally, the definition "reciprocating movement of" has been added to new claim 11 as supported by the disclosure, for example, at page 4, lines 1-18.

These revisions more accurately define the precise point where the production installation is situated. They also define that the production units (4) will transform the reciprocating movement of the water mass to another form of kinetic energy. Further support can be found in the disclosure, for example, in original claim 5 and the disclosure, for example,

at page 4, lines 1-18. This means that the production units will utilize energy of both propagating and returning wave.

No new matter has been added by the above amendments.

Claims 11-15 are pending upon entry of this amendment.

II. INDEFINITENESS REJECTIONS

Claims 1-10 were rejected under 35 USC §112, second paragraph, as being indefinite for the reasons set forth on page 2 of the Office Action.

Applicants respectfully submit that the present amendment overcomes this rejection. In particular, it is noted that original claims 1-10 have been canceled and have been replaced with new claims 11-15 that do not contain the language rejected by the Examiner. Withdrawal of the rejection is therefore solicited.

III. PRIOR ART REJECTIONS

On page 2 of the Office Action, claims 1-15 and 7-8 were rejected under 35 USC §102(b) as anticipated by GRAFF (U.S. 4,001,597).

On page 3 of the Office Action, claims 6, 9 and 10 were rejected under 35 USC §103(a) as being obvious over GRAFF (U.S. 4,001,597).

These rejections are respectfully traversed. The rejections will be addressed together below.

As can be seen from new claim 11, the invention relates to a production installation that has been anchored or otherwise fixedly connected to a very specific region of the bottom of a water basin (for example, to a bottom of a sea). At this so-called intermediate water depth, the depth of a water basin H to the wavelength of waves is roughly $1/20 - \frac{1}{2}$ and the movement of the water mass is mainly reciprocating. The production unit will transform to the kinetic energy, the kinetic energy of both forward and return waves.

At page 3 of the Office Action, it was indicated that "it would be obvious at the time the invention was made to a person having ordinary skill in the art to utilize the output fluid for different purposes in GRAFF for the purpose of driving different devices and to select different depth to get different wave pressure."

Applicants respectfully disagree and submit that the cited prior art reference fails to disclose or suggest each and every element of the claimed invention.

First, Applicants are of the opinion that the Office requires, in this case, too much inventive skills from a person having ordinary skill in the art. Such a person would have to first choose the exact right location on a bottom (P) of a water basin among many possible locations. See new claim 11 which specifies that: the location where device would be attached to the bottom (P) of a water basin at intermediate water region, to

a depth deeper than the wave breaking line, roughly in an area where the ratio of the depth of the water basin H to the wavelength L , is in the range from $1/20 - \frac{1}{2}$. The cited prior art fails to disclose or suggest this.

Further, after doing so, the skilled artisan would have to be able to modify the device according to GRAFF so that it would transform the production kinetic energy of the reciprocating movement of water mass into some other form of energy, like electric. In this regard, it should be noted, that recovering the kinetic energy of the reciprocating movement of water mass outside the intermediate water region is not an option, since the reciprocating movement of the water mass is too irregular outside the intermediate area to be much of use. In this respect, Applicants respectfully submit that the teachings of the cited prior art reference are inoperable to arrive at the claimed invention. Thus, the GRAFF teaches away from the concept of the present invention.

In particular, GRAFF relates to an energy generating system, which can basically be placed anywhere on the bottom of a sea bed (on the ocean bed; page 1, lines 45-50). If one looks more closely at the teachings of this reference, it is clear that this system is not intended to be at the intermediate water depth as required by the present invention. Nor is it suitable to be used in the intermediate water depth. In this regard, please note that:

a) the device according to GRAFF will operate best at the shore-side of the breaker-line very near of a shoreline, where a highest possible wave will overturn on a device or will go over the device, and

b) the device of GRAFF is not able to use reciprocating movement of the water mass.

Further, GRAFF describes a spring located system which will expand the cylinders and raise the pressure plates after the upper ends of mentioned pressure plates have been forced down by waves. This kind of system as disclosed in GRAFF is not suitable to recover the kinetic energy of reciprocating waves as in the present invention. Instead, it will only recover the energy of forward moving waves. In contrast, the production installation of the present invention utilizes kinetic energy of both the ongoing and returning waves. The system described in GRAFF has, at its best, only about 50% efficiency compared to that of the production installation of the invention.

The mode of action described in the system of GRAFF implies strongly, that it is intended to for use in shallow water, near the shore, and/or between shoreline and breaking line, where water has only substantial potential energy left. This can be seen from the abstract of this patent, which reads: "waves passing over the pressure plate will force...after which spring will expand the cylinders...". See also claim 1 of this patent that reads: "an electric power generating system...and

means including a coil spring inside each cylinder for expanding it and raising the overlying pressure plate...". This kind of structure is not suitable for recovering the kinetic energy of reciprocating waves at all. The structure of this system is more suitable for recovering the potential energy of wave, not kinetic energy. This strongly indicates that the kind of system in GRAFF is better to be placed near the shore, since the wave energy near the shore contains more potential energy and less kinetic energy, and since kinetic energy of waves is consumed at a breaker line and therefore water mass has mainly potential energy left after the breaking line. If one looks at a trajectory point of water mass at shallow water, it is more or less rounded and it has mainly potential energy. At the intermediate water depth, before the breaker line, water has mainly kinetic energy and a trajectory of water mass is reciprocating one.

Based on the above, it is clear that GRAFF fails to disclose or suggest each and every element of the claimed invention, and in fact, teaches away from the claimed invention.

Also, it should be noted that GRAFF further teaches away from the concept of the instant invention that is intended to be located at the intermediate water area. See the Abstract of GRAFF, wherein it is indicated that: "a plurality of base members are seated on an ocean bed adjacent the shore...". See also claim 1 that indicates "...a plurality of base members seated on an ocean bed adjacent the shore". On page 1, lines 32-35 of

GRAFF, it is indicated that this system "will be placed at suitable location, that is, "along coastline". On page 2, lines 48-62, it is also indicated that it is better to locate near shoreline. For example, it is said that some units will be located "exposed ocean floor", which implies strongly placing near the shore. Additionally, from page 2, line 67 to page 3, line 1, it is further disclosed that there should be some precautions, if the waves become unusually high. It is noted that waves will become unusually high only near the shore, not at the intermediate water.

Based on the above, Applicants respectfully submit that the claimed invention is novel and unobvious over GRAFF. The present invention differs substantially from the system referred to in GRAFF with respect to location, mode of action and efficiency. The production installation of the instant invention is located before the breaking line, usually at the depth about 5-15 m, whereas the system in GRAFF is located between a breaking line and the shore.

The mode of action of the present invention is also different from the system in GRAFF. The system described in GRAFF has substantially inferior efficiency, since it does not disclose the use of the kinetic energy of reciprocating waves, but utilizes only incoming energy of waves.

Lastly, the system referred to in GRAFF is regularly exposed to air, and therefore is not submerged under water surface as required by the instant claimed invention.

In view of the above, it is respectfully submitted that GRAFF fails to disclose or suggest each and every element of the claimed invention, and in fact, teaches away from the concept of the claimed invention. Based on this teaching away, it is clear that GRAFF is not predictive of the claimed invention. There simply would be no reasonable expectation of success of modifying the teachings in GRAFF to arrive at the claimed invention.

For these reasons, it is respectfully submitted that the production installation for utilizing wave energy of independent claim 11 is novel and unobvious over the teachings of GRAFF. Dependent claims 12-15 are also novel and unobvious in view of their dependency on claim 11.

Therefore, the above-noted prior art rejections are untenable and should be withdrawn.

IV. PRIOR ART REFERENCES MADE OF RECORD BUT NOT RELIED UPON

On page 3 of the Office Action, the Examiner noted certain references that were made of record but not relied upon. Applicants herein provide a brief explanation as to why such references do not disclose or suggest the instant invention.

U.S. 5,592,816: (Fig 3.): This document discloses a hydroelectric turbine which is located anywhere on an ocean where

water flows. Nothing has been said of intermediate water area and utilizing reciprocating movement of water mass efficiently.

U.S. 5,394,695 discloses a device in which fluid is conveyed through series of stages (floats) which pump fluid to drive turbines and electric generators or other energy conversion devices. The movement of floats will follow the waves on a surface of water reservoir. The structure and function of this device is very different to claimed invention.

U.S. 5,105,094: The energy is recovered from an advancing movement of a wave. This apparatus contains a main water pipeline that is under the water. The wave pushes water inside the pipeline from the inlet means. The movement of the water in pipeline will move the piston upwards on the other end of the pipeline. The downward motion of the piston is done by gravity. The movement of the piston is converted to energy. This apparatus uses advancing movement of a wave, but the backward movement of a wave is not utilized, since the downward motion of the piston is done by gravity.

U.S. 4,355,513: This apparatus converts the temperature difference between ocean surface and bottom to energy. The ideas behind this invention are very different compared to the claimed invention.

U.S. 4,152,895: This apparatus converts ocean surface wave energy into rotational energy. This whole structure can be anchored to offshore. The idea to convert surface energy of waves

into kinetic energy idea seems to have little common with the main ideas behind the claimed invention. In the claimed invention the kinetic energy of bottom waves will be converted into more useful form of energy.

U.S. 4,092,828: This patent document presents a hydroelectric plant operated by wave action and supported by the ocean floor. The floats rise and fall with the ocean waves to cause pivotal motion of the lever arms. These lever arms move the pistons via secondary levers and pumps. The movement of pistons may be used to pump water or pressurize air. Although this structure is supported by the ocean floor it will utilize the potential energy of surface waves and its energy producing units are mainly above the water level. The claimed invention utilizes the kinetic energy of bottom waves and its energy producing units are submerged.

U.S. 4,091 618: This document shows a (surface) wave motion power generating system. It comprises a floating buoy attached to a pump. The buoy can be in the form of cylindrical ring mounted on the leg of an ocean platform. This system utilizes again the potential energy of surface waves and its energy producing units are mainly above the water level. The claimed invention utilizes the kinetic energy of bottom waves and its energy producing units are submerged.

U.S. 4,170,738: This document describes a device for recovering both kinetic and potential energy from the waves. It

consists of a sail that extends from a bottom of the water basin to the water surface. It will be placed to a suitable depth to follow the back and forth motion of waves. The exact location of the device is not defined but since it will recover the kinetic and potential energy of waves by moving vertically and horizontally it is not intended to use the kinetic energy of the intermediate area at the ocean bottom.

U.S. 4,170,788: A slight complement to the device of U.S. 4,170,738. Differs from the claimed invention in same way as U.S. 4,170,738.

U.S. 4,002,416: This document describes a motor such as a pump, which can be activated by oscillating motion of waves. It has a paddle disposed to oscillate about horizontally axis located in the plane of the paddle. The paddle is placed on the surf, below the water level. The paddle depends on the stationary axis that is located above the surface. This pump will utilize most apparently the energy of surface waves and is located near the surface.

For these reasons, it is respectfully submitted that the references are made of record but not relied upon by the Office are not considered pertinent to the instant disclosure. These references neither disclose nor suggest the claimed invention.

V. CONCLUSION

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is in condition for allowance and an early notice to that effect is hereby requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact the undersigned attorney at the telephone number below.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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